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NOTES ON POTT'S FRACTURE, WITH A FEW REMARKS ON THE TREATMENT OF OLD CASES.

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ALLUDING to the fracture associated with his name Percival Pott, a hundred years ago, wrote :—" The inferior fractured end of the fibula falls inwards towards the tibia, that extremity of the bone which forms the outer ankle is turned somewhat outwards and upwards, and the tibia having lost its proper support, and not being of itself capable of steadily preserving its true perpendicular bearing, is forced off from the astragalus inwards. by which means the weak bursal or common ligament of the joint is violently stretched if not torn, and the strong ones which fasten the tibia to the astragalus and os calcis are always lacerated, thus producing at the same time a perfect fracture and a partial dislocation, to which is sometimes added a wound in the integuments made by the bone at the inner ankle; by this means, and indeed as a necessary consequence, all the tendons which pass behind or under, or are attached to the extremities of the tibia or fibula or os calcis, have their natural direction and disposition so altered, that instead of performing their appointed actions they all contribute to the distortion of the foot, and that by turning it outwards and upwards."

Since this description was published no great advance has been made either in the anatomy or treatment of this lesion. Indeed, its limitations are so well defined that there is scarcely room for even an ingenious speculation. The clinical signs are, briefly, a depression over the site of injury, eversion of the foot, a prominent inner malleolus, and a swelling round the ankle-joint. The fracture takes place usually about two inches above the malleolus, the deltoid ligament being often ruptured, and the astragalus separated from the tibia. Before entering upon an analysis of cases it will be better to discuss a little more in detail the various factors which together constitute this injury.

(a) *Dislocation of Foot outwards.*—This is generally supposed to be an essential and absolutely diagnostic symptom. It is however not quite so. A slight outward displacement may occur on separation of the tibia from the fibula, without fracture of the fibula, and outward displacement of the astragalus. I have seen at least two such cases where the fibula was undeniably intact, and yet the simulation to Pott's fracture quite marked. In one case a gentleman in jumping a ditch alighted on a stone upon the opposite side, and was with difficulty able to walk home, a distance of three-quarters of a mile. The foot was slightly everted, the inner malleolus prominent, and the ankle-joint swollen. On further examination I found the fibula unbroken, and the distance between the malleoli obviously increased. The ankle-joint was firmly fixed. On attempting to reduce the deformity, which was accomplished with difficulty, crepitus was experienced. The fall on the foot had by means of the astragalus wrenched off that portion of the tibia immediately on the inner side of the tibio-fibular articulation, the force, trivial though it appeared, being sufficient to tear the interosseous ligament, to wedge the astragalus, to slightly separate the bones, and to keep the foot fixed in an everted position. In the second case the eversion was very slight, and there was no crepitus nor fracture of the fibula, the injury being also caused by a fall upon the sole.

The amount of dislocation of course varies, and I have seen it so marked in the outward direction, that with the tibia perpendicular the inner malleolus would all but touch the ground. This outward displacement is sometimes accompanied by a backward luxation (although I can find no published record of it), which is evidenced by a shortened foot, a lengthened heel, and extended ankle. The correctness of the diagnosis is readily verified during reduction of the deformity.

(b) *Fracture above External Malleolus.*—This varies to the extent of 3 or 4 inches. The precise spot is often obscured by rigidity due to swelling. The patient himself is often under these circumstances a valuable diagnostician. Often guided by pain he places his finger on the exact point. An even better test is

to press upon the upper third of the fibula, maintaining the pressure as we travel downwards; the pain is generally referred to the fractured ends. The direction of fracture can generally only be guessed at—and that badly. Roughly we may decide that transverse fractures give rise to easier ascertained crepitation, and that fractures from within, taking a direction downwards and outwards, are accompanied by least deformity. I may add that I have on several occasions diagnosed fracture of the fibula on Pott's site without any dislocation. A little later I shall give one or two such cases.

(c) *Prominent Inner Malleolus*.—This is always present, but is not essentially diagnostic. It occurs in certain fractures of the lower end of the tibia. It may be diagnosed from similar deformity, due to fractures of both bones above the ankle, by its lesser mobility and crepitation; in sprains of the ankle, where laceration of the deltoid ligament has taken place, a tense swelling is often found sufficiently deceptive to lead the inexperienced into errors of diagnosis.

(d) *Separation of Astragalus from Tibia*.—The distance of course varies, and can be fairly estimated by the degree of deformity. The majority of indirect fractures are doubtlessly caused by the pressure which the astragalus is made to exercise on the lower end of the fibula.

(e) *Crepitation*.—Absence of this is not sufficient to prove immunity from fracture. In over twenty-five cases out of seventy-five it was absent during the manipulations which, having regard to the patient's comfort, I thought it justifiable to make. Eversion of the foot usually gave rise to no crepitus. Inversion frequently produced it, but the movement best calculated to elicit it consisted in combined flexion and inversion. It is always easy to diagnose the crepitus of fractured fibula from that, in consequence of a chipped inner malleolus.

(f) *Fracture of Inner Malleolus*.—Complicated twenty-nine cases out of seventy-five. The diagnosis was generally simple. Where this fracture complicates the danger to the skin is increased. Crepitus can rarely be felt until reduction is partially complete.

Of seventy-five cases I find on reference that fifty-seven were males and eighteen women. The age varied greatly—

3 occurred between the ages 5 and 10 of whom 2 were males.							
10	"	"	10	"	20	"	7
25	"	"	20	"	30	"	21
21	"	"	30	"	40	"	18
9	"	"	40	"	50	"	4
4	"	"	50	"	60	"	2
2	"	"	60	"	70	"	2
1 was 74 years old, a male.							

About 30 per cent. of the cases sought surgical aid on the day of the accident, about 35 per cent. on the second day, about 15 per cent. on the third day, and the remainder later. In fifty-four out of seventy-five cases the fracture was of the right fibula.

In regard to the question of the cause of deformity it appears to me that there has been a great deal too much written. I have no belief in any muscular action theory. It occurs and is intensified by the continuation of the force which was employed upon the fracture. A foot is fractured by inversion, and generally the deformity is inversion, and so with eversion. Patients generally do not realise the enormity of the accident, and continue for a few strides onward until a trivial deformity becomes typical. Two cases will illustrate this. A gentleman vaulting from his bath fell upon the inside of his left ankle, and "feeling something give," he looked at his foot. There was no deformity to be observed. The pain not being acute he walked as far as the towel rail, donned his dressing-coat, and found his way to the bedroom. The deformity by this time had, to his amazement, become typical. Another instance will be afforded by a case I saw, in consultation with a medical friend, who told me that he had been called to the patient, who had fallen on his ankle, the point of obscurity being the presence or not of a fracture. On entering the patient's room my friend was astonished to find a well-marked case of Pott's fracture with an exceptionally pronounced eversion. The transformation was explained by the patient, who confessed to having doubts con-

cerning the suspected fracture, attempted to walk, experienced great pain, and in trying to relieve the foot from pressure clumsily augmented it, with the result I have described. Generally speaking those fractures due to direct force are less prone to luxation, for reasons which must be obvious. Furthermore, those fractures of the fibula, where the patients have attempted to walk, are generally more pronounced than in the cases of those who have resigned without an effort. In speaking of too early removal of restraint I will further emphasise this point.

There is no difference in the principle of treatment of Pott's fracture from that of any other. There are two objects to be attained—(a) the reduction of deformity, (b) the maintenance of reduction.

(a) *The Reduction of Deformity.*—This is accomplished the more readily in proportion to the absence of delay. Water dressings and Fabian policies should be rigidly discarded, as even twenty-four hours may make a material difference in the easy success of manipulations. My advice to house-surgeons and others is to seize the earliest chance of replacing the astragaloid luxation. A patient brought straight from his fall, with no matter how terrible an eversion, presents no approach to difficulty. It is hard to give any rule of procedure which alike will remedy the defect of symmetry in all cases. Generally speaking, after flexing the knee it is best to firmly grasp the foot, the dorsum in the right hand and the heel in the left, and to steadily pull for a few seconds. Next move the foot a few times from side to side and powerfully invert. Should this fail, start again, repeating the former movements, and on each occasion a gain in the right direction is recorded. This may be even again repeated. If, notwithstanding, deformity yet remains, increase it by still further everting the foot,¹ and then repeat the primary manipulations. Should it still be unsatisfactory a gradual replacement must be attempted by means of pads. But the effort at reduction should be long continued, and very rarely indeed given up as futile. Once reduc-

¹ Mr Thomas has drawn attention to this in the reduction of luxations, vide *Contributions of Surgery*, part vi.

tion be complete there is no tendency to recurrence of deformity, and therefore no real occasion to employ those splints which are devised to counteract special displacement. Lest, however, a little deformity remain, it is well to put on a couple of side splints and a posterior splint, the side splints being armed with pads suitably arranged to minimise deformity. The splints I have been accustomed to use are made of malleable sheet iron, and the practitioner can with his foot press the ends of both side splints, so that they approximate on the sole, forming a support which maintains the ankle at right angles. When the splints are adjusted the patient must be directed to flex the knee and lie on the outer side of the leg. Just a few words respecting the position of the ankle. It is of the utmost importance that the ankle be kept at right angles, and that the bed-clothes be prevented from pressing upon the toes and extending the joint. After results, very serious by reason of their tediousness, are due to neglect of this precaution, and hardly a month passes but a case presents itself at our out-patient department, walking upon his toe with a contracted tendo Achillis, which might have been well months previously were it not due to the overlooking of this apparently trivial detail. Patients should be kept in splints for fully five weeks, and even then the foot should only be very tenderly dealt with. Mr H. O. Thomas is accustomed to crook the heel of the boot, the slope being from without inwards, the lowest point being on the inner side, as soon as the time for walking commences, and this precaution will be found of much service. The more moderate the exercise during the initial period of walking, the better the ultimate result. The patient should be kept under observation for at least three months. Personally I very rarely treat a Pott's fracture, which appears at the out-patient department as an indoor-patient. With proper precautions, complete reduction, and firm splinting I have hitherto experienced no evils by this practice. Rest should of necessity be prescribed during the intervals between visits.

Before concluding this rough sketch I desire to offer a few suggestions regarding the treatment of what we may term return cases of Pott's fracture. I mean those patients who, long after

active treatment is over, complain of pain, deformity, or inability to walk. First among these troubles we may place :—

1. *Persistent Pain over the Ankle-Joint.*—This is generally due to injury which the articular surface has suffered at the time of accident. It must have been sufficiently severe to have outlasted the period of rest which the fracture necessitated. The pain is generally most marked over the deltoid ligament, and though lessened does not disappear at night time. It is accompanied by fulness over the joint, which may or may not include the rest of the foot. It is needless to say that passive motions in such cases are sad blunders, and result in increased pain and decreased movement. Rest is the remedy.

2. *Swelling of Foot increased on movement.*—This may be due to chronic synovitis, but generally results from circulatory disturbances, arising sometimes from the results of tight bandaging, but oftener from inefficient reduction, with subsequent outpourings of callus. The errors in circulation are best attended to by bidding the patient to elevate his leg when in bed, to keep his knee slightly flexed, to apply hot applications, and to adopt surface friction from knee to foot twice every day. A little exercise is good, but immediately on return let the patient fall on his back, and elevate the foot.

3. *Pain over Site of Fracture.*—As a rule this is due to the unsoundness of the bond of union, and is frequently the result of permitting too early perambulation. It may or may not be accompanied by deformity. If it is I shall describe the mode of procedure in the following section. If deformity be absent, the ankle should be still further kept quiet—should be supported by plaister—and later on the heel of the boot crooked as suggested by Mr Thomas. If despite these precautions walking is irksome, an iron stem should be fitted to the outside of the leg, and into the heel of the boot, and the leg well bandaged to it night and morning.

4. *Contracted Tendo Achillis.*—This is a common accident of neglected precaution in the treatment of Pott's fracture. There is no excuse for it. It should be an axiom that the foot be kept at right angles. Simple as the treatment of such cases

may appear, in actual practice real difficulty is encountered. Suppose for instance the case is one where the joint has become stiff from articular mischief. Division of the tendon here will avail but little, and we shall be forced to adopt those measures applicable to the reduction of ankylosis. In other instances, also, where there is no arthritis, much force has to be expended upon the foot in addition to tenotomy before the result is respectable. It is, therefore, clearly wiser to avoid the necessity. The after treatment consists in knocking the heel off patient's boot, and in directing him to amply exercise the stiff articulation.

5. *Deformity*.—This may be due either to inefficient primary reduction or to return of displacement from pressure upon the foot during unsoundness of the fibular bond of union. A case will illustrate this latter condition:—J. F., a sailor, came to the Stanley Hospital Out-patient Department, having been treated at a neighbouring charity for Pott's fracture. He had been an indoor-patient for a fortnight, and had then been in plaster of Paris, which was removed fourteen days later. Three weeks from that date I first saw him, when he complained of swelling in the foot, pain over the site of fracture, and just a trace of deformity. I gave him instructions what to do, and bade him call to see me after a week's interval. In two months he called again with an ugly deformity, increased pain, and helplessness of foot. He had been obliged to sail for Bordeaux, to put pressure upon his foot, and to neglect all remedial measures. This led me to the conclusion that, if deformity can be brought about by yielding of the fracture during the unsoundness of the callus, that such unsoundness may be called to aid in the reduction of inefficiently reduced fractures; subsequent opportunities and experiences confirmed this. I have, in all, treated seven cases of what one may term old Pott's fractures, with results satisfactory beyond expectation. At some future date I shall take an opportunity of publishing in detail, with accompanying diagrams, the results I have attained. Meanwhile, I will be content to give very briefly the following instances:—

Early in 1885, M. L. applied to me at the Stanley Hospital

on behalf of a marked deformity of her ankle. Eighteen months previously she was an inmate of one of our hospitals for Pott's fracture, and having undergone the usual treatment, was dismissed a little early. She complained of severe pain, more especially towards evening, and seemed anxious that something should be done to what she called her crooked limb. The pain, although shared by the foot generally, was much more acute over the site of the old fracture, and pressure denoted great tenderness. She was admitted as an in-patient, and agreed to forcible reduction. Ether was administered by Dr E. R. Williams, and assisted by my colleague Mr Sheldon I commenced the manipulations. The patient's foot was brought over the edge of the operating table and laid on the outer side, the table supporting the fibula up to the point of fracture. Our combined strengths was then exercised upon the foot in efforts at eversion, and this was supplemented by the use of a powerful wrench introduced by Mr Thomas¹ for the cure without osteotomy of obstinate club foot. A marked improvement resulted after a few minutes' effort, and the patient was sent to bed, the limb being firmly bandaged in splints and padded so as to continue the good effects of the forced reduction. The result was such that one could barely distinguish a difference in the shape of her ankles. During reduction there was no actual fracture of fibula. Although the bone at every stage appeared hard and unyielding, it succumbed slowly to the amount of weight applied.

The second case bore a similar history of treatment. He was a sailor, aged 54 years. The fibula had been three months fractured when I first saw him. I reduced it in the presence of Dr H. Chapman and my colleague Dr Whitford. After the forcible reduction I treated the case as an out-patient, and the end fully justified my course. And so with the other cases. The after-treatment of these cases is always tedious, and for a lengthened period, say five or six months, patients should only be permitted to walk on condition of their employing the stem support and the crooked boot. By

¹ See *Provincial Medical Journal*, October 1886.

these means the weight of the body favours inversion, and so tends to lessen the deformity. Many might be interested in an easy method of estimating the degree of deformity. Pass a malleable strip of metal from halfway up the leg along the fibula, under the heel, along inner malleolus, and up tibia. Take the metal off the foot and place it on paper whereon a tracing may be made. In this way improvement can be readily chronicled, when failure has attended the attempts by photography.

